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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA, SAN FRANCISCO DIVISION

WAYMO LLC,  
Plaintiff,

vs.

UBER TECHNOLOGIES, INC.;  
OTTOMOTTO LLC; OTTO TRUCKING  
LLC,  
Defendants.

CASE NO. 3:17-cv-00939

**REPLY DECLARATION OF GREGORY  
KINTZ**

**REDACTED VERSION OF DOCUMENT  
SOUGHT TO BE SEALED**

1 I, Gregory Kintz, hereby declare as follows.

2 1. I have been asked by counsel for Waymo LLC (“Waymo”) to provide an opinion as to  
 3 whether Defendant Ottomotto LLC (“OttoMotto”), Defendant Otto Trucking LLC (“Otto Trucking”),<sup>1</sup>  
 4 or Defendant Uber Technologies, Inc. (“Uber”, and collectively, “Defendants”), through the accused  
 5 LiDAR devices, infringe United States Patent Nos. 8,836,922 (“the ’922 Patent”) and 9,285,464 (“the  
 6 ’464 Patent”) (collectively, “the Asserted Patents”). I have also been asked to provide an opinion on  
 7 Waymo’s trade secrets incorporated into the accused LiDAR devices. The analysis and opinions  
 8 contained in this declaration are based on the information currently available to me. I reserve the right  
 9 to supplement and amend my opinions after further discovery.

10 2. In addition to the materials I considered in my Original Declaration, I have considered  
 11 the following materials for this Reply Declaration:

- 12 • Transcripts of depositions taken pursuant to the Court’s order regarding expedited  
 13 discovery (Dkt No. 61);
- 14 • Documents produced by the parties pursuant to the Court’s order regarding  
 15 expedited discovery (Dkt No. 61);
- 16 • Defendant’s opposition to Waymo’s preliminary injunction, including the  
 17 supporting declarations and materials cited therein;
- 18 • A physical inspection of Defendants’ Fuji LiDAR device and Owl LiDAR device;
- 19 • Photographs taken from an inspection of Defendants’ [REDACTED] LiDAR device.

20 **I. TRADE SECRETS DISCUSSED IN MY ORIGINAL DECLARATION**

21 3. In this section I address trade secrets discussed in my Original Declaration.  
 22 Specifically, I respond in relevant part to the declarations of Drs. Paul McManamon and Michael  
 23 Lebby, and also discuss evidence that has become available since I submitted my Original  
 24 Declaration.

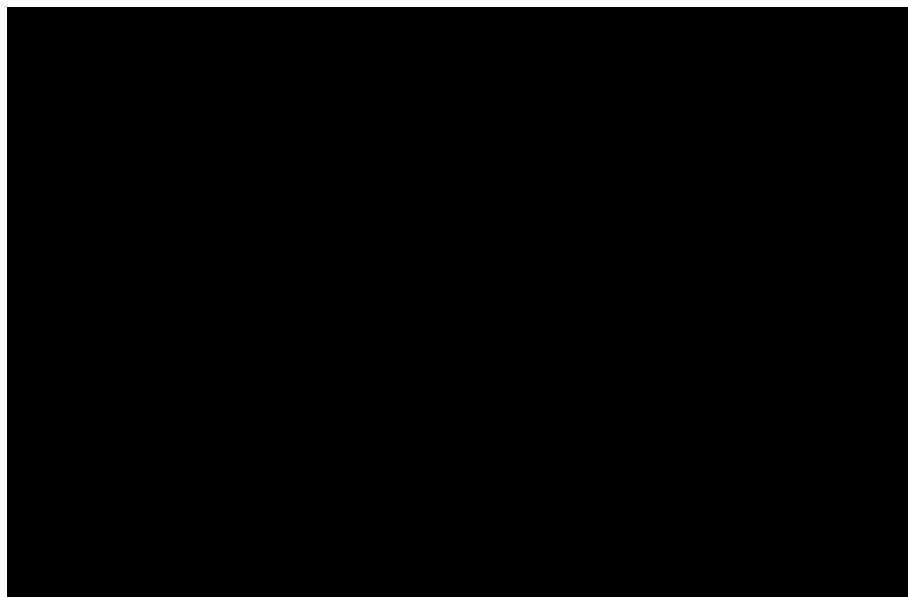
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27 <sup>1</sup> OttoMotto and Otto Trucking are sometimes collectively referred to as “Otto.”  
 28

[illegible]

1           4. As I wrote in my Original Declaration (Kintz Decl. ¶¶ 29-35), Waymo's GBr3  
2 features [REDACTED]  
3 [REDACTED]  
4 [REDACTED]. The [REDACTED] results in a [REDACTED]  
5 [REDACTED] in the field of view that [REDACTED] and a [REDACTED]  
6 [REDACTED] in the field of view that [REDACTED]. In addition, each  
7 diode is [REDACTED]. These design features improve the  
8 "vision" of the LiDAR system by [REDACTED]  
9 [REDACTED]. Further, the Fuji PCB incorporates the [REDACTED]  
10 concept of GBr3.

11           5. *Use by Defendants.* My visual inspection of the Fuji device on April 11, 2017  
12 confirmed that the Fuji device features [REDACTED]  
13 [REDACTED]  
14 [REDACTED]. Like the GBr3 device, the  
15 [REDACTED] in the Fuji device results in a [REDACTED]  
16 [REDACTED] that [REDACTED] and a [REDACTED]  
17 [REDACTED] are used in the field of view that [REDACTED]. Below are photographs from my  
18 physical inspection that illustrate this specific [REDACTED].  
19



1 (Jaffe Reply Decl. Ex. 93, UBER00006245.)

2 6. Neither Dr. McManamon nor Dr. Lebby denies that the Fuji system uses this  
3 design. Documentary evidence produced by Uber confirms that the Fuji device features [REDACTED]

4 [REDACTED]  
5 [REDACTED]  
6 [REDACTED]. Exhibit B to Mr. Haslim's declaration shows the [REDACTED]

7 [REDACTED] in the Fuji device, referenced to [REDACTED]

8 [REDACTED]. (Haslim Decl. Ex. B.) Using [REDACTED] as an example, the [REDACTED]  
9 between [REDACTED]. (*Id.*)

10 7. ***Qualification as Trade Secret.*** Dr. McManamon cites two references that he  
11 opines disclose [REDACTED] that Waymo claims as a trade secret.

12 However, as most clearly stated in Trade Secret No. 1, [REDACTED]  
13 [REDACTED]  
14 [REDACTED]  
15 [REDACTED]  
16 [REDACTED] (TS List No. 1.) Neither of Dr.

17 McManamon's two cited references discloses this feature.

18 8. Dr. McManamon's first cited reference is Mundhenk et al., "PanDAR: A wide-  
19 area, frame-rate, and full color LIDAR with foveated region using backfilling interpolation  
20 upsampling." Dr. McManamon claims that this is an application of the well-known optical  
21 concept called foveated vision. I agree that PanDAR implements the concept of foveated vision,  
22 *i.e.*, the concept of "[h]aving greater resolution in the middle of the field of view." (McManamon  
23 Decl. ¶ 51.) The PanDAR system, however, achieved this by stacking two Velodyne 32E LiDAR  
24 systems on top of each other, resulting in more beams in the middle of the field of view. This is  
25 distinct from an approach in which [REDACTED]  
26 [REDACTED]  
27 [REDACTED]. Indeed, Dr.

1 McManamon agreed at his deposition that the approach taught by the PanDAR system did not use  
 2 Waymo's [REDACTED] approach:

3 [REDACTED]  
 4 [REDACTED]  
 5 [REDACTED]  
 6 [REDACTED]  
 7 [REDACTED]  
 8 [REDACTED]  
 9 [REDACTED]  
 10 [REDACTED]  
 11 [REDACTED]

12 (Jaffe Reply Decl. Ex. 83, 4/19/2017 McManamon Depo. Tr. 57:25-58:14.) Adding further  
 13 support to my opinion that the “dual stacked” Velodyne approach used by the PanDAR system is  
 14 distinct from Waymo's [REDACTED] is the fact that [REDACTED]  
 15 [REDACTED] in favor of the [REDACTED]  
 16 approach misappropriated from Waymo. (See Boehmke Decl. ¶¶ 9-11, 14-16, Ex. H at 5.)

17 9. Unlike the design taught by the PanDAR reference, Waymo's [REDACTED]  
 18 [REDACTED], resulting in  
 19 [REDACTED], not at the middle of the field of view as  
 20 would be the case if Waymo had just been applying the principle of foveated vision. Accordingly,  
 21 I disagree with Dr. McManamon that this trade secret is simply an implementation of foveated  
 22 vision. Instead, it is one of Waymo's particular solutions to the problem of sensing for self-  
 23 driving car applications.

24 10. Dr. McManamon also relies on U.S. Patent No. 8,767,190 to Velodyne. However,  
 25 this patent discloses placing one laser diode per PCB and mounting 32 PCBs on a frame, with  
 26 even angular spacing between each laser diode. It then teaches varying the overall beam density  
 27 of the system “by simply removing or not installing any desired number of emitter/detector pairs.”  
 28 ('190 patent at 6:49-50.) The patent does not teach [REDACTED]

1 [REDACTED]; rather, it simply says that in some applications the designer may want  
2 to save costs by reducing the overall number of emitter/detector pairs that the system employs. It  
3 does not say that the density should be adjusted to [REDACTED] and it does  
4 not teach any other specific pattern. The patent also recognizes that reducing the overall density  
5 reduces the vertical resolution of the system, which the '190 patent explains may be acceptable for  
6 some applications that do not require high resolution but require cheaper sensors. ('190 patent at  
7 6:50-52.) The '190 patent therefore is best understood as teaching a tradeoff between overall  
8 system resolution and cost. By contrast, Waymo's solution [REDACTED]  
9 [REDACTED]  
10 [REDACTED]  
11 [REDACTED] At his deposition, Dr. McManamon  
12 admitted that he did not cite a specific disclosure from the '190 patent describing [REDACTED]  
13 [REDACTED]. (Jaffe Reply Decl. Ex. 83, 4/19/2017 McManamon Depo. Tr. 61:9-12.)

14 11. Dr. McManamon's annotated Figure 5 of the '190 patent, at paragraph 57 of his  
15 declaration and reproduced below, does not appear in the patent itself and does not correspond to  
16 any specific embodiment disclosed by the patent. Rather, Dr. McManamon has simply attempted  
17 to use hindsight to annotate Figure 5 so that it superficially resembles the [REDACTED]  
18 [REDACTED].  
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12. Dr. McManamon's annotated Figure 5 also does not accurately depict Waymo's solution to the problem, apparently copied by the Fuji design. Removing certain diodes from certain boards results not only in decreased resolution as discussed above, but also results in zones of constant angular spacing. This is because the '190 patent, one-diode per PCB design, is fundamentally based on the [REDACTED] In other words, because [REDACTED] to the extent another PCB is removed, the designer eventually reaches a point where the [REDACTED] This is illustrated in Dr. McManamon's annotated Figure 5 [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]



1 [REDACTED]  
2 [REDACTED] Even the '190 patent's passing suggestion (at 6:61-7:7) of placing several  
3 emitters per board does not remove the inherent limitation on the system that results from having  
4 the boards themselves as [REDACTED].

5 13. Waymo's designs, by contrast, are not so restricted, with [REDACTED]  
6 [REDACTED]  
7 [REDACTED]  
8 [REDACTED]. By using [REDACTED]  
9 [REDACTED] in accordance with the constraints imposed by the [REDACTED]  
10 [REDACTED], as is the case in the Velodyne '190 patent), Waymo  
11 (and Uber) are able to achieve [REDACTED].

12 14. Dr. Lebby briefly opines (Lebby Decl. ¶¶ 38-39) that the [REDACTED] of the  
13 GBr3 laser diodes is well-known and has previously been used in LiDAR systems. Dr. Lebby  
14 cites the same references (the PanDAR reference and the '190 patent) as Dr. McManamon, and I  
15 disagree with Dr. Lebby's opinion for the same reasons I disagree with Dr. McManamon's  
16 opinion regarding the same subject, as discussed above. In addition, I note that the two images  
17 provided in paragraph 61 of Dr. Lebby's declaration depicting a GBr3 and a Fuji transmit board  
18 look very similar, suggesting direct or derivative use of Waymo's [REDACTED]  
19 trade secret in the Fuji design.

20 15. Other than Waymo and Uber's LiDAR systems, I am not aware of any other  
21 LiDAR system that includes [REDACTED]  
22 [REDACTED]  
23 [REDACTED]. My opinion therefore remains that Waymo's unique  
24 [REDACTED] is a trade secret and that Uber uses that trade secret.

25 16. *Uber did not independently develop* [REDACTED]. I understand  
26 that Dr. McManamon contends that Uber independently developed the [REDACTED] of the Fuji  
27 system based on work by Mr. Boehmke prior to Uber's acquisition of Anthony Levandowski's  
28 company Otto. (McManamon Decl. ¶¶ 41-48.) For the reasons set forth below, I believe these

1 conclusions are flawed, and I have seen no evidence that Mr. Boehmke independently developed  
2 the [REDACTED]  
3 [REDACTED]  
4 [REDACTED] for the Fuji system.

5 17. Dr. McManamon opines that [REDACTED], Mr.  
6 Boehmke worked on developing [REDACTED] for Uber's self-driving  
7 cars." (McManamon Decl. ¶ 43.) Dr. McManamon further opines that in [REDACTED]  
8 [REDACTED], Mr. Boehmke "pulled together the design options he previously considered" and developed  
9 the "[REDACTED]" and that the "positioning and orientation of the diodes on  
10 the transmit board of the Fuji design" were ultimately "based" on Mr. Boehmke's work. (*Id.* ¶  
11 48.) However, Dr. McManamon explained at his deposition that [REDACTED]  
12 [REDACTED]  
13 [REDACTED]. (Jaffe Reply Decl. Ex. 83, 4/19/2017 McManamon Depo. Tr. at  
14 45:17-47:4.)

15 18. I also note that the neither Mr. Boehmke nor Mr. Haslim ever unequivocally state  
16 in their declarations that Mr. Boehmke's work (at any time) was the basis for the current Fuji  
17 design. The most Mr. Boehmke is willing to say is that [REDACTED]  
18 [REDACTED] that he prepared on [REDACTED] (Ex. I) was "provided to" James Haslim and  
19 that Mr. Boehmke "understand[s] that James [Haslim] and his team used the data in this summary  
20 to generate the initial optical cavity designs and transmit PCBs designs for the Fuji design."  
21 (Boehmke Decl. ¶ 18.) Mr. Haslim also states that he "understands" Mr. Boehmke to have  
22 provided such information. (Haslim Decl. ¶ 6.) But, Mr. Haslim never explains how—or even  
23 whether—the information provided by Mr. Boehmke was used. Later, Mr. Haslim states that  
24 Exhibit B to his declaration "is a true and correct copy of the [REDACTED]  
25 [REDACTED]" of the Fuji system, but here he makes no connection between  
26 Exhibit B and any of the work that Mr. Boehmke allegedly provided in [REDACTED]. (*Id.* ¶  
27 15.)  
28

1           19.     Based on my independent analysis of the evidence, I conclude that the [REDACTED]  
2 [REDACTED] of the Fuji design could not have been independently developed by Mr.  
3 Boehmke prior to his exposure to Otto, because the designs Mr. Boehmke was considering at this  
4 time were very different. For example, the [REDACTED] depicted at paragraph 8 of the  
5 Boehmke Declaration and at paragraph 43 of the McManamon Declaration do not show a  
6 [REDACTED], but rather [REDACTED]  
7 [REDACTED]. While the [REDACTED]  
8 [REDACTED], they are [REDACTED].  
9 Also the [REDACTED] in the sense that the [REDACTED]  
10 [REDACTED]. As discussed  
11 previously, this type of [REDACTED] is distinct from the [REDACTED]  
12 [REDACTED] that Waymo claims as a trade secret and which Uber is currently using in its Fuji design.

13           20.     I also note that there is no corroborating evidence that between November 2015 to  
14 March 2016, Mr. Boehmke ever considered positioning [REDACTED].  
15 While the figure shown at paragraph 12 of Mr. Boehmke's declaration shows lasers being emitted  
16 from a curved source, it is possible this figure merely corresponds to an approach similar to that  
17 described in the '190 patent, with an array of evenly spaced, one-diode PCBs, which themselves  
18 are positioned within a curved frame. Again, as previously discussed, this is distinct from  
19 Waymo's concept and the current Fuji design of [REDACTED]  
20 [REDACTED].

21           21.     The first document provided by Mr. Boehmke that shows any recognition of the  
22 ability to [REDACTED] is Exhibit H which is dated [REDACTED]. Here,  
23 Mr. Boehmke describes, [REDACTED] that would involve [REDACTED]  
24 [REDACTED]  
25 [REDACTED] (Boehmke Decl. Ex. H at 10.) In this document, Mr. Boehmke describes  
26 [REDACTED]  
27 [REDACTED] (*Id.*)  
28

22. Importantly, at around this same time, I have reviewed documents produced by Uber that indicate Mr. Boehmke's "[REDACTED]" was developed at time that he and Uber were collaborating with Otto and Mr. Levandowski in particular. For example, on [REDACTED] (Jaffe Reply Decl. Ex. 72, UBER00008543.) Subsequent documents show that Mr. Boehmke, Mr. Levandowski, and others at Otto were working closely on designs [REDACTED]. (Jaffe Reply Decl. Ex. 98, UBER00008553; Jaffe Reply Decl. Ex. 99, UBER00008557; Jaffe Reply Decl. Ex. 97, UBER00008494.)

23. For all of these reasons, I disagree that the evidence shows that Uber independently developed the [REDACTED] trade secret in the Fuji design. In my opinion, the available evidence does not directly indicate how or where Uber derived this concept, confirming my earlier opinion that it was derived from Uber's exposure to Waymo's confidential trade secrets through both Otto and Mr. Levandowski.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

24. As I wrote [REDACTED]

[REDACTED]

[REDACTED] optimal spacing and, to preserve [REDACTED] between the [REDACTED] on the receive block and the [REDACTED] on the transmit block, Waymo used [REDACTED] in the transmit block. (Droz Decl. ¶ 22; TS List Nos. 2-3.) Waymo determined that the [REDACTED] included [REDACTED] on each of the [REDACTED] and [REDACTED] on each of the [REDACTED]. (TS List No. 3.) [REDACTED] is a trade secret. (TS List Nos. 2-3.)

1           25.     *Use by Defendants.* Defendants have confirmed that, like GBr3, the Fuji LiDAR  
 2 uses [REDACTED], and that [REDACTED] contain [REDACTED] and [REDACTED]  
 3 [REDACTED] contain [REDACTED]. (Haslim Decl. ¶ 13.)

4           26.     Dr. Lebby opines that Defendants' Fuji LiDAR system does not make use of  
 5 Waymo's Trade Secret Nos. 2 and 3. First, with respect to Trade Secret No. 2, Dr. Lebby takes a  
 6 very narrow view of what [REDACTED], arguing that the [REDACTED]  
 7 [REDACTED], and that because of this, the [REDACTED] are really [REDACTED]  
 8 [REDACTED] (Lebby Decl. ¶¶ 29-45.) The Fuji system, as a whole, [REDACTED], and  
 9 viewed as a [REDACTED] there is [REDACTED]  
 10 [REDACTED]. In that [REDACTED], as Dr. Lebby recognizes, there are [REDACTED] distributed  
 11 across [REDACTED], with [REDACTED]. (Lebby Decl. ¶ 44.)  
 12 Accordingly, it is my opinion that the Fuji system practices or at least is derived from Trade Secret  
 13 No. 2, which requires a [REDACTED] transmit block comprised of [REDACTED], with [REDACTED]  
 14 [REDACTED].

15           27.     Even under Dr. Lebby's narrow view, it is still my opinion that the Fuji device uses  
 16 Trade Secret List No. 2. The Fuji device simply takes the [REDACTED] and [REDACTED]  
 17 [REDACTED] while still maintaining the same number of [REDACTED] and the same distribution of  
 18 [REDACTED]. At most, this is a minor modification derived from Waymo's trade secret  
 19 design that does not change the fundamental arrangement of components.

20           28.     Next. Dr. Lebby takes the view that Uber's Fuji system does not use Trade Secret  
 21 No. 3 because it arranges its [REDACTED] in [REDACTED] rather than in [REDACTED]  
 22 [REDACTED]. However, this too is only a minor modification in the arrangement [REDACTED]  
 23 [REDACTED] that does not change the fact that Defendants have derived their design from Waymo's trade  
 24 secret. It is my understanding that minor modifications, elaborations, or even improvements  
 25 cannot absolve the Defendants from liability if the ultimate design is derived from Waymo's trade  
 26 secret information. Uber has not provided any explanation or analysis to show that simply  
 27 [REDACTED] changes the fundamental operation of the overall device, and I  
 28 am not aware of any. Nor have Defendants provided any evidence to rebut my view that this

1 design is simply the result of starting with the configuration claimed in Trade Secret 3 and slightly  
2 [REDACTED].

3 29. *Qualification as Trade Secret.* Dr. Lebby further opines that a [REDACTED]  
4 [REDACTED] is just one of the few workable configurations for the transmit block of any [REDACTED].  
5 (Lebby Decl. ¶ 30.)

6 30. In my opinion, Dr. Lebby's analysis generally relies on hindsight, starting from his  
7 knowledge of Waymo's trade secrets to reason that those trade secrets were "one of a few  
8 workable configurations." (Lebby Decl. ¶ 30.) It is clear that Waymo's specific solution to the  
9 problem of optimizing a LiDAR system for self-driving car applications is not generally known to  
10 the public or in the field, and Dr. Lebby has not cited evidence to show that any has or would  
11 arrive at Waymo's specific designs. Dr. Lebby's attempt to discount the relevance of alternative  
12 arrangements of [REDACTED] as not ideal (Lebby Decl. ¶ 33) is not supported by the  
13 evidence. In fact, James Haslim explained in his declaration that [REDACTED]  
14 [REDACTED]) and [REDACTED]  
15 [REDACTED]. (Haslim Decl. ¶ 11.) Waymo's GBr2 design used [REDACTED].  
16 The fact that Waymo's solution placed [REDACTED] and [REDACTED] is a novel and  
17 unexpected design and therefore a valuable trade secret, as outlined in my Original Declaration.  
18 (Kintz Decl. ¶¶ 36-43.)

19 31. Dr. Lebby's reliance on Xingsheng Liu's "Packaging of High Power  
20 Semiconductor Lasers" is misplaced. Liu's textbook is addressed to general principles of  
21 semiconductor laser packaging and does not specifically relate to LiDAR or other optical laser  
22 system design. Indeed, as a person of skill in the art of laser-based optical mapping systems, I  
23 would have referenced such semiconductor packaging literature for general principles but would  
24 not draw from such references any conclusions regarding what was possible or feasible in  
25 implementing the detailed design for a complex laser-based optical system such as a LiDAR  
26 system.

27 32. As outlined by Liu, semiconductor packaging involves placing the thin patterned  
28 semiconductor material that makes up an integrated circuit (i.e., the chips), such as a laser diode

chip, together with components in a package that can be used as part of a larger circuit, with cathodes and anodes for making connections from the chip to the larger circuit in which the chip will be used. For example, this is depicted in Figures 2.1 and 2.2 of Liu:

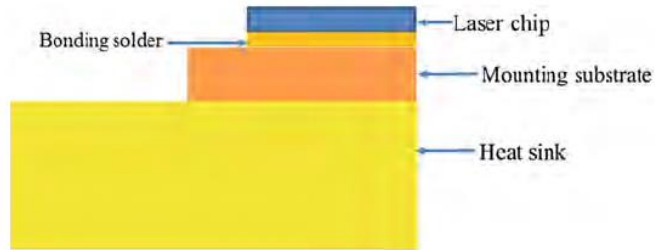


Fig. 2.1 Basic structure of a semiconductor laser [1]

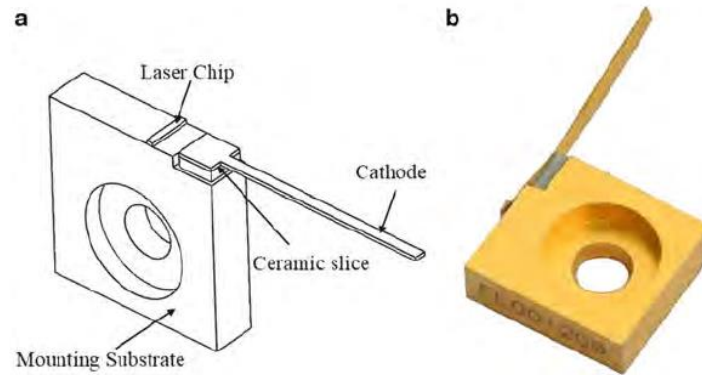


Fig. 2.2 The typical C-mount packaging structure and a picture of a C-mount laser device [1, 3]

33. As Liu explains, a laser diode package could include laser bars (such as depicted in Figure 2.17) or laser stacks (such as depicted in Figure 2.27).

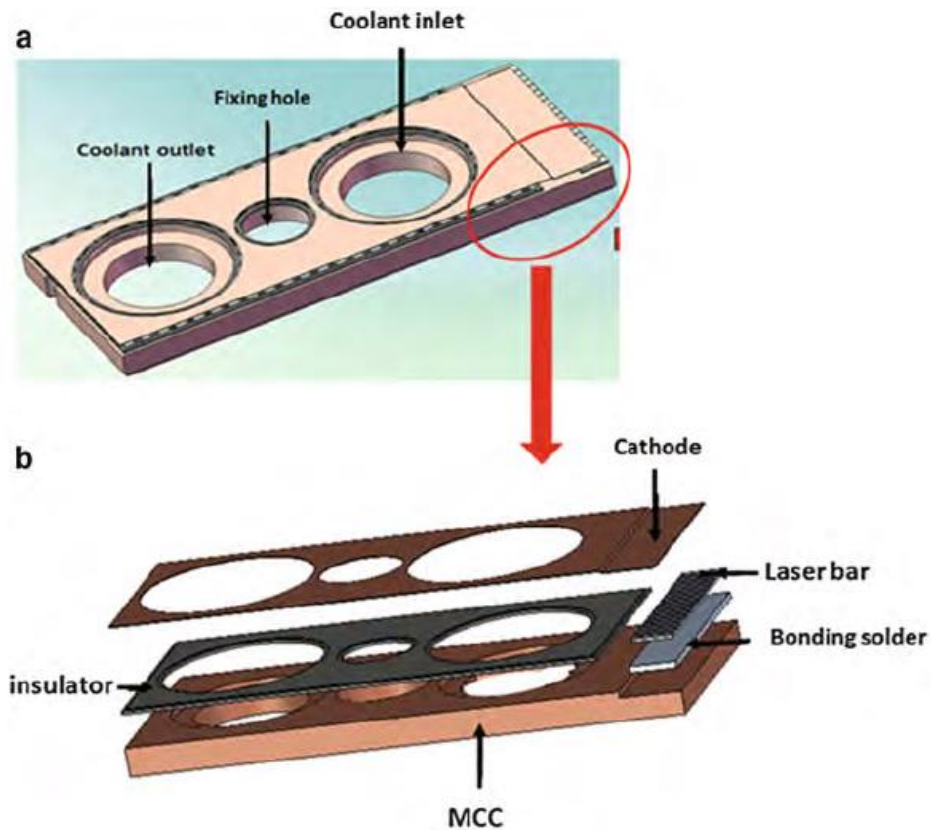


Fig. 2.17 The packaging structure of a MCC laser bar [13]

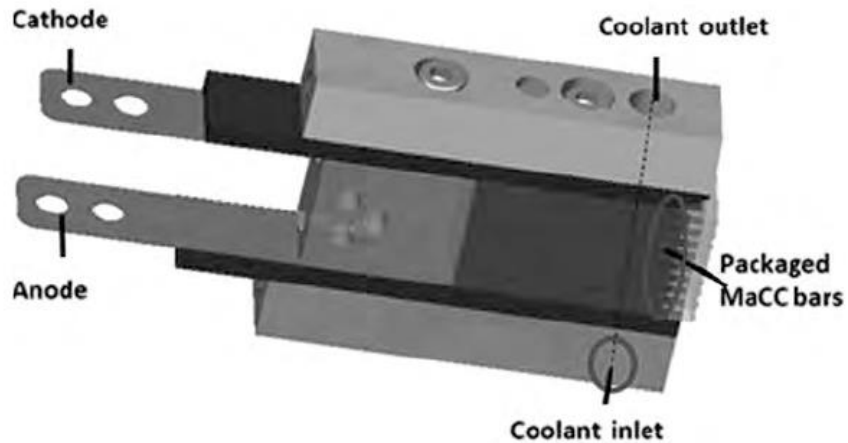


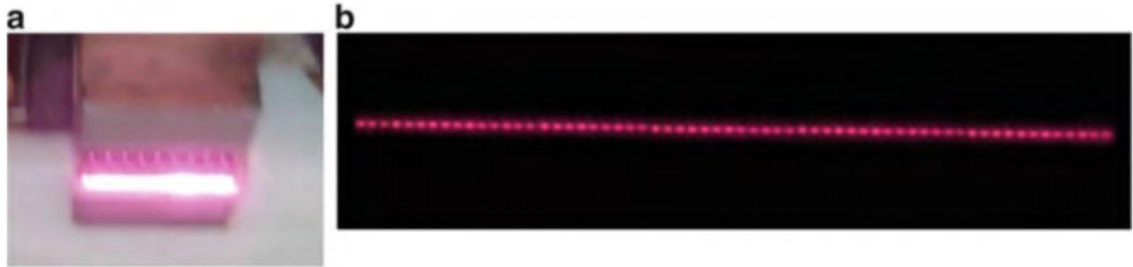
Fig. 2.27 The V-stack semiconductor laser packaged by MaCC laser bars [16]

34. As Dr. Lebby noted in his deposition, laser bars are “a single piece of semiconductor.” (Jaffe Reply Decl., Ex. 84, Lebby Depo. Tr. at 52:21-22.) Moreover, packaged laser bars, and packaged laser stacks composed of multiple laser bars stacked on top of each other, are not “singulated” emitters, in that they do not produce a single output beam but instead produce



1 separate lines (Jaffe Reply Decl., Ex. 84, Lebby Depo. Tr. at 52:23-53:1), as depicted in Figures  
 2 5.4(b) and 5.6 of Liu, reproduced below. [REDACTED]

3 [REDACTED], as Dr. Lebby recognized in his deposition. (Jaffe Reply Decl., Ex. 84, Lebby  
 4 Depo. Tr. at 53:2-4.)



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 10 **Fig. 5.4** The radiation and the near-field pattern of an 808 nm semiconductor laser bar [11]. (a)  
 11 The radiation of a semiconductor laser bar. (b) The near-field pattern of a semiconductor laser bar

12 **Fig. 5.6** The far-field  
 13 pattern of a semiconductor  
 14 laser stack with fast axis  
 15 collimation [11]



16  
 17  
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 20 35. Nowhere does Liu teach what I have seen in both Waymo's GBr design and Uber's  
 21 Fuji system, namely the [REDACTED]  
 22 [REDACTED]. In fact, nowhere does Liu use the word "PCB" or "board," which was Dr.  
 23 Lebby's own word used to describe the laser stack in Liu Figure 5.5 noted in his deposition. (Jaffe  
 24 Reply Decl. 84, Lebby Depo. Tr. at 52:15-17.) This is not surprising, as Liu is not directed to the  
 25 use of laser diodes in optical systems such as a LiDAR system, but is directed merely to packaging  
 26 laser diodes for potential subsequent use in larger circuits. Indeed, Waymo's GBr3 Tx Board  
 27 Engineering Requirements Specification document describes [REDACTED]  
 28

1 [REDACTED] (P. 6.) Other than GBr and Fuji, I have  
2 not seen an optical system use [REDACTED].

3 36. Accordingly, Dr. Lebby's reliance on Figure 5.5 of Liu, in which a laser stack is  
4 depicted, is misplaced. Figure 5.5 depicts laser bars stacked directly on top of each other, with the  
5 anode of the top-most stack serving as the cathode of the middle stack and the anode of the middle  
6 stack serving as the cathode of the bottom stack. Figure 5.5 does not teach anything about using  
7 [REDACTED], in which the stacking does not provide the  
8 electrical connections to the laser diodes and requires use of the proprietary [REDACTED]  
9 developed by Waymo.

10 [REDACTED]  
11 [REDACTED]  
12 [REDACTED]  
13 [REDACTED]  
14 [REDACTED]  
15 [REDACTED]  
16 [REDACTED]  
17 [REDACTED]  
18 [REDACTED]  
19 [REDACTED]  
20 37. As I stated in my Original Declaration (Kintz. Decl. ¶¶ 44-48), Waymo's  
21 completed PCB design files for [REDACTED] are proprietary design specifications from which  
22 Defendants most likely adapted the Fuji PCB designs.

23 38. *Use by Defendants.* Dr. Lebby opines that it is not reasonable to infer that the Fuji  
24 PCB was adapted from Waymo's PCB design files. (Lebby Decl. ¶¶ 59-62). I disagree. Dr.  
25 Lebby states that the [REDACTED], but makes no  
26 attempt to quantify this statement. Thus, he does not counter my opinion that the Fuji PCB  
27 appears to be [REDACTED] of the GBr3 design files downloaded by Anthony Levandowski.  
28 As previously stated, I compared the [REDACTED] against the Fuji PCB by

1 [REDACTED] and measuring the [REDACTED] by  
 2 each PCB. The ratio of the [REDACTED]  
 3 [REDACTED] Stated a different way, for each PCB, the ratio between the  
 4 distance to the [REDACTED]  
 5 [REDACTED]. (Kintz Decl. ¶ 47.) This demonstrates that the Fuji PCB [REDACTED]  
 6 [REDACTED] to mimic the [REDACTED] of the Waymo board, [REDACTED]  
 7 [REDACTED].

8 39. **Qualification as Trade Secret.** Neither Dr. McManamon nor Dr. Lebby dispute  
 9 that Waymo's detailed design schematics are confidential Waymo trade secrets.

10 [REDACTED]  
 11 [REDACTED]  
 12 [REDACTED]  
 13 [REDACTED]  
 14 40. As I stated in my Original Declaration (Kintz Decl. ¶¶ 49-53), Waymo positions its  
 15 [REDACTED], rather than [REDACTED]. Known  
 16 LiDAR systems strive to [REDACTED] for heat  
 17 dissipation, but Waymo [REDACTED] to ensure that [REDACTED]  
 18 [REDACTED], while at the same time allowing space to [REDACTED]  
 19 [REDACTED] to both [REDACTED] with respect to the plane of the PCB.  
 20 (TS List Nos. 7, 9.)

21 41. **Use by Defendants.** Dr. Lebby does not deny that the Fuji PCB [REDACTED]  
 22 [REDACTED]. At Dr. Lebby's deposition, he testified that based on his discussion with Uber engineer  
 23 James Haslim, [REDACTED]. (Jaffe  
 24 Reply Decl. 84, Lebby Depo. Tr. at 58:16-23; *see also* Jaffe Reply Decl. 68, Haslim Depo. Tr. at  
 25 64:49.) This [REDACTED] (which is atypical in the field) is the same amount that the  
 26 [REDACTED] in Waymo's system. Thus, Defendants are not simply using Waymo's  
 27 [REDACTED] trade secret, they are [REDACTED]  
 28 [REDACTED]

42. **Qualification as Trade Secret.** Dr. Lebby opines that [REDACTED] [REDACTED] “is a known design choice” and therefore cannot be a trade secret. (Lebby Decl. ¶¶ 46-51.) However, Dr. Lebby again relies on the Liu textbook, as well as a 2007 dissertation (Christian Scholz, *Thermal and Mechanical Optimization of Diode Laser Bar Packaging*), in the field of semiconductor laser packaging. Again, as an optical engineer, I would consult semiconductor laser packaging literature for only general principles and would not draw from such references any conclusions regarding what was possible or feasible in implementing the detailed design for a complex laser-based optical system such as a LiDAR system. Also, I have seen no evidence that Uber or Otto relied on this or any other similar publications to design their LiDAR system. Indeed, Scholz shows that the laser bar packaging to which the dissertation is directed is three steps removed from the application, such as building a LiDAR system, and is closer to (and one step away from) semiconductor wafer chip technology.

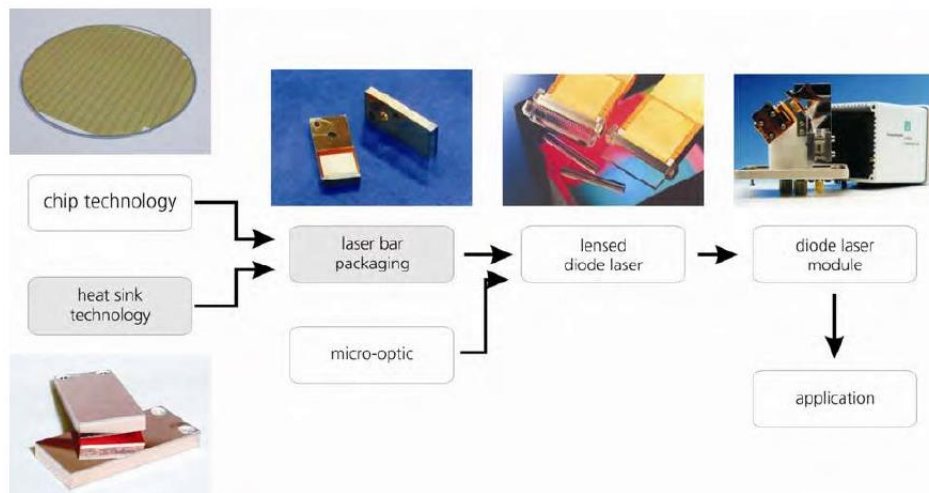


Figure 1-2: Value-added chain for diode laser bars

43. Moreover, both Liu and the Scholz dissertation teach away from using significant [REDACTED]. Indeed, as Dr. Lebby notes, Liu describes [REDACTED] as undesirable features in semiconductor packaging. (Lebby Decl. ¶ 49.) However, Dr. Lebby omits Figure 7.50, showing Liu’s [REDACTED] from his declaration. I reproduce that Figure below.



**Fig. 7.50** Ideal alignment between the diode laser die and the mounting substrate [1]

44. The Scholz dissertation also does not teach Waymo's trade secret of [REDACTED]. Scholz discusses [REDACTED] laser bars (i.e., strips of semiconductor material containing rows of laser diode emitters) [REDACTED] of the heat sink when packaging it all together. However, Scholz notes that the [REDACTED] which again teaches away from the trade secret. As discussed above, however, both Waymo's GBr3 LiDAR system and Uber's Fuji LiDAR system [REDACTED] on which they are mounted. This is [REDACTED]

45. I also note that Dr. Lebby ignores the additional very important benefit of [REDACTED] described in my Original Declaration, which is that it enables [REDACTED], which is directly relevant to LiDAR applications. (Kintz Decl. ¶ 50.)

46. As I stated in my Original Declaration (Kintz. Decl. ¶¶ 54-55), Waymo specifies that [REDACTED] in each PCB. A [REDACTED] through [REDACTED] ensures that [REDACTED], and Waymo directs for its laser diodes to be positioned [REDACTED]. (*Id.*) Thus, [REDACTED] must be placed with maximum precision.

47. *Use by Defendants.* Dr. Lebby does not deny that Defendants [REDACTED]. In addition, Waymo engineer Asheem Linaval

1 testified that the Fuji PCB contains [REDACTED]  
 2 [REDACTED] (Jaffe Reply Decl. Ex. 65, Linaval Depo. Trans. at 59:4-12.)

3 48. Dr. Lebby stated that the Fuji PCB uses [REDACTED]  
 4 [REDACTED] (Lebby Decl. ¶ 58.) However, Exhibit B to the  
 5 Haslim Declaration discloses [REDACTED]  
 6 [REDACTED] (Haslim Decl. Ex. B.) These points are referenced [REDACTED]  
 7 [REDACTED] (*Id.*) This tells me that Defendants use [REDACTED]  
 8 [REDACTED]—one of which is squarely within Waymo’s trade secret  
 9 design.

10 49. *Qualification as Trade Secret.* Dr. Lebby opines that “the concept of [REDACTED]  
 11 [REDACTED] and positioning laser  
 12 diodes [REDACTED]” is not a trade secret because neither of these concepts are trade  
 13 secrets. (Lebby Decl. ¶¶ 52-58.) In my opinion, Dr. Lebby mischaracterizes the nature of this  
 14 trade secret. This trade secret is formulated as [REDACTED]  
 15 [REDACTED]  
 16 [REDACTED]  
 17 [REDACTED] (TS List No. 14.) This  
 18 trade secret is an [REDACTED] comprised of three elements: (1) [REDACTED]  
 19 [REDACTED]; (2) using [REDACTED] for placement of  
 20 the laser diodes; and (3) [REDACTED]. Dr. Lebby  
 21 attempts to divide this trade secret into its component parts and claim that each component part  
 22 was known, but the trade secret as practiced by Waymo is the combination of all elements in one  
 23 technique for [REDACTED].

24 50. None of the references cited by Dr. Lebby are in the field of LiDAR, and none of  
 25 the references disclose the unique combination of elements into a technique for [REDACTED]  
 26 [REDACTED] as claimed by Waymo so as to maintain the precise [REDACTED]  
 27 [REDACTED] relative to each other notwithstanding significant [REDACTED]  
 28 [REDACTED] for PCBs. As Waymo engineer Pierre-Yves Droz

1 explained in his deposition, this trade secret is about [REDACTED]  
2 [REDACTED]. (Jaffe Reply Decl. Ex. 90, Droz  
3 Depo. Tr. at 129:10-131:16.) The references Dr. Lebby cites do not achieve this important result.

4 51. Specifically, U.S. Patent No. 4,244,109 discloses only holes for mounting a single  
5 PCB onto a frame. ('109 patent at 1:66-68.) Nowhere does it disclose more than one PCB, much  
6 less [REDACTED]

7 [REDACTED], as required by this trade secret. Indeed, Dr. Lebby testified that the  
8 '109 patent shows only one printed circuit board. (Jaffe Reply Decl. Ex. 84, Lebby Depo. Tr. at  
9 69:15-19.)

10 52. The German patent application No. DE 3031103 does not disclose [REDACTED]  
11 [REDACTED], nor is it in the field of LiDAR or even in  
12 the wider optics field. Instead, it discloses holes made under solder bosses or tracks on PCBs so  
13 that, "[w]hen the translucent multi-layer board is held up against a strong light source, the  
14 positions of the solder bosses relative to the bored holes can be clearly seen." (DE 3031103 at  
15 Abstract.) This describes a visual alignment technique, which would be less than ideal in a  
16 LiDAR system requiring [REDACTED]

17 [REDACTED], as required by this trade secret. Dr.  
18 Lebby testified that the German patent application [REDACTED]  
19 [REDACTED] (Jaffe Reply Decl. Ex. 84, Lebby Depo. Tr. 73:14.)

20 53. Finally, U.S. Patent No. 4,432,037, which is also not in the LiDAR or optics fields,  
21 discloses only the use of "location holes which fix a reference point" as well as "a reference line"  
22 to position conductive patterns on a single PCB. ('037 patent at 1:57-60.) Nowhere does it  
23 disclose [REDACTED]

24 [REDACTED]

25 54. Accordingly, the technique for [REDACTED]  
26 [REDACTED] is  
27 Waymo's unique solution to the problem of [REDACTED] to each  
28

1 other while [REDACTED] and is thus Waymo's trade  
 2 secret.

## 3 **II. TRADE SECRETS NOT DISCUSSED IN MY ORIGINAL DECLARATION**

4 55. In this section I address trade secrets that I did not discuss in my Original  
 5 Declaration. I discuss them in my Reply Declaration because new evidence has become available  
 6 since March 10, 2017. I note that this list of trade secrets is not exhaustive, and I reserve the right  
 7 to analyze and offer opinions about additional trade secrets as further evidence is provided.

8 [REDACTED]  
 9 [REDACTED]  
 10 [REDACTED]  
 11 [REDACTED]  
 12 56. *Use by Defendants.* My visual inspection of the Uber Fuji device confirmed that  
 13 Uber is using [REDACTED]  
 14 [REDACTED]. This is apparent from the fact that [REDACTED], and [REDACTED]  
 15 [REDACTED] ensure that the diode is [REDACTED].

16 57. *Qualification as Trade Secret.* Positioning the [REDACTED] such that they are [REDACTED]  
 17 [REDACTED] is not generally known in the relevant field. As discussed earlier,  
 18 PCB diodes for LiDAR applications almost always are positioned such that the [REDACTED]  
 19 [REDACTED] by some distance. A placement that is [REDACTED]  
 20 [REDACTED] has independent economic value because it allows [REDACTED]  
 21 [REDACTED] and thus avoid having a portion of their [REDACTED]  
 22 [REDACTED].

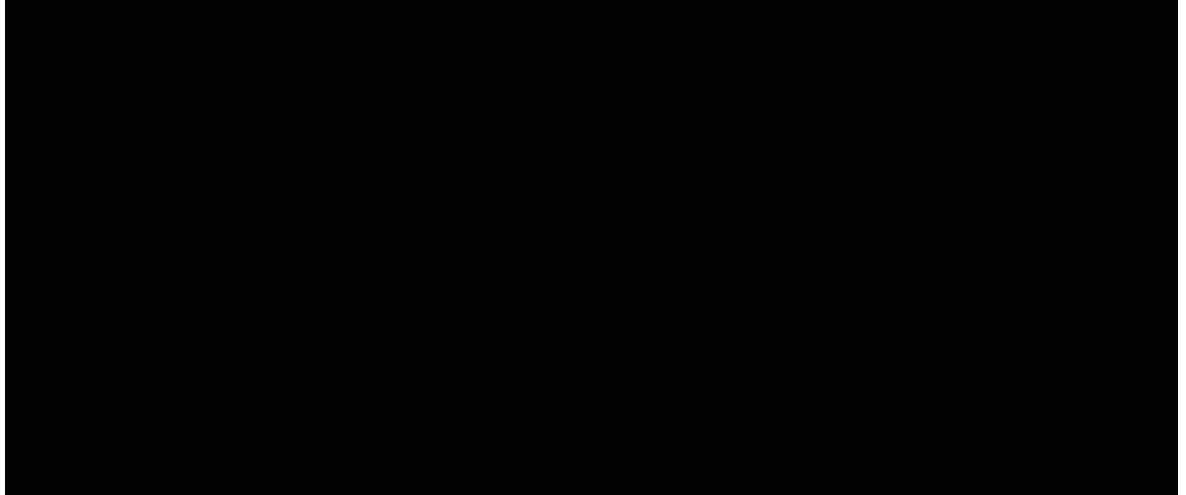
23 [REDACTED]  
 24 [REDACTED]  
 25 [REDACTED]  
 26 [REDACTED]  
 27 58. *Use by Defendants.* Defendants do not deny that the Fuji LiDAR uses [REDACTED]  
 28 [REDACTED]. Further, my visual inspection of the Fuji device confirmed



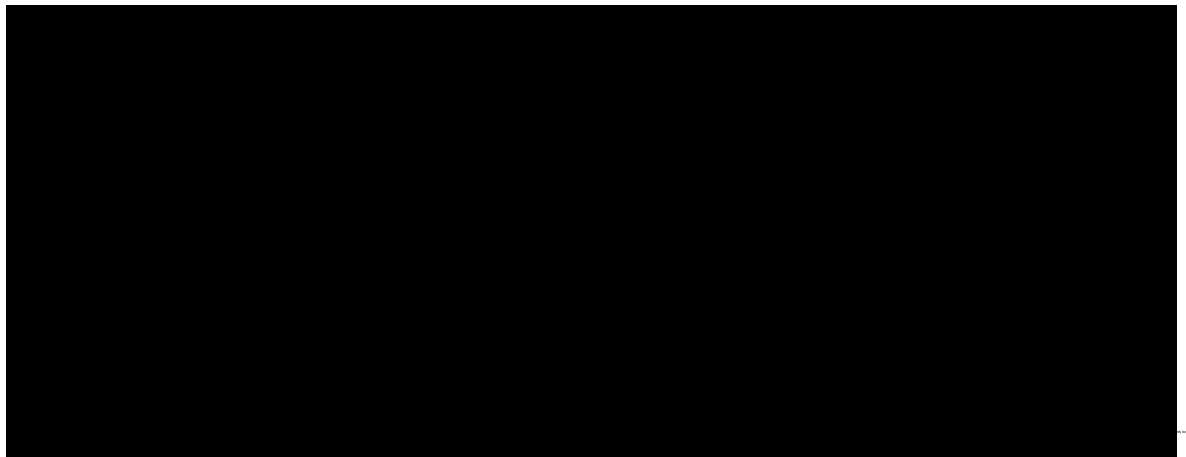
1 that such [REDACTED] on the Fuji board such that they are [REDACTED]

2 [REDACTED]. As is evident from the photographs below, [REDACTED]

3 [REDACTED].



11 (Jaffe Reply Decl. Ex. 95, UBER00006248.)



19 (Jaffe Reply Decl. Ex. 96, UBER00006251.)

21 59. In order to accommodate the [REDACTED], the [REDACTED] must be configured within  
22 a larger [REDACTED]. Such a [REDACTED] requires a  
23 [REDACTED] to ensure that the [REDACTED]  
24 [REDACTED]. As shown below, the overall shape and configuration  
25 of the [REDACTED] in Uber's Fuji design is nearly identical to that of Waymo's design, indicating  
26 that the same [REDACTED] is being employed by Uber.

1            Uber's [REDACTED]

Waymo's [REDACTED]

2 [REDACTED]

3 [REDACTED]

4 [REDACTED]

5 [REDACTED]

6 [REDACTED]

7 [REDACTED]

8 [REDACTED]

9 [REDACTED]

10 (Jaffe Reply Decl. Ex. 106, UBER00011612 (left); Jaffe Opening Decl. Ex. 2 at 15 (right)),.

11            60.        Indeed, based on documents produced in this case, it is now clear that as early as

12 [REDACTED], Otto engineers, with the involvement of Mr. Levandowski, contacted [REDACTED] —

13 Waymo's confidential vendor for [REDACTED]

14 [REDACTED] (Jaffe Reply Decl. Ex. 104, UBER00011613.) In fact, [REDACTED]

15 [REDACTED]

16 [REDACTED] (*Id.*) By [REDACTED], engineers at

17 Otto [REDACTED]

18 [REDACTED] (Jaffe Reply Decl. Ex. 105, UBER00011263.) This evidence confirms that Uber

19 is using Waymo's claimed trade secret 10.

20            61.        *Qualification as Trade Secret.* The [REDACTED] for Waymo's [REDACTED]

21 [REDACTED] qualifies as a trade secret. Providing a [REDACTED] for each

22 [REDACTED] requires a [REDACTED]. Indeed, neither the

23 Hamamatsu design, nor the Liu design cited by Dr. Lebby as characteristic of the prior art teach or

24 suggest the [REDACTED] required to accommodate the [REDACTED] in Waymo's unique

25 PCB configuration. The public domain [REDACTED] cited by Dr. Lebby are [REDACTED], that

26 appear to be simply [REDACTED].

27

28

1           62.     Waymo's [REDACTED], on the other hand, requires a  
2 [REDACTED] in order to ensure each [REDACTED] is capable of precisely  
3 aligning the [REDACTED] with its [REDACTED]. The use of such a [REDACTED]  
4 [REDACTED] is atypical in the field, and would therefore not be generally known. It is  
5 therefore no surprise that the Otto engineers [REDACTED]  
6 [REDACTED].

7           63.     Waymo's manufacturing process for a [REDACTED] also derives independent  
8 economic value from not generally being known in the field. The [REDACTED] results in  
9 [REDACTED]. Moreover,  
10 the design allows for [REDACTED]  
11 [REDACTED].

12           [REDACTED]  
13 [REDACTED]  
14 [REDACTED]  
15 [REDACTED]

16           64.     *Use by Defendants.* My visual inspection of the Fuji device confirmed the high  
17 likelihood that Defendants use this trade secret. This trade secret involves a technique for  
18 [REDACTED]. In order to ensure proper alignment of the  
19 optical components, the PCBs must generally [REDACTED]  
20 [REDACTED]. Thus, Waymo developed a [REDACTED]  
21 [REDACTED] of their corresponding PCB. These [REDACTED] thus ensure that the PCBs are  
22 precisely spaced and positioned.

23           65.     During my physical inspection on April 11, 2017, I observed [REDACTED]  
24 [REDACTED]. The objects do not appear to be  
25 [REDACTED]  
26 [REDACTED]  
27 [REDACTED]

28

(Jaffe Reply Decl. Ex. 94, UBER00006246.)

66. ***Qualification as Trade Secret.*** This trade secret is not generally known in the relevant field of technology. I am not aware of any other LiDAR system that uses such [REDACTED] in order to ensure proper alignment of the optical equipment. Waymo's trade secret also derives independent economic value because it simplifies the assembly of the LiDAR devices and avoids the painstaking process of having to precisely align individual optical components. This technique provides Waymo a competitive advantage over competitors having no knowledge of the technique.

67. ***Use by Defendants.*** Evidence produced since the filing of my original declaration confirms that the Defendants use this trade secret. First, an email chain between Anthony Levandowski, [REDACTED], and others demonstrates that as early as [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 100, UBER00011242.) In the first email of the chain, [REDACTED] [REDACTED] (Id.) In a follow up email, [REDACTED]

1 [REDACTED]  
2 (Id.) [REDACTED]  
3 [REDACTED]  
4 [REDACTED]  
5 [REDACTED] (Id.)

6 68. My inspection of Uber's Fuji device confirmed that it is using Trade Secret No. 19.  
7 [REDACTED]  
8 [REDACTED] allows the device to [REDACTED]  
9 [REDACTED] including the motherboard housed in  
10 the fixed portion of the device. (Jaffe Reply Decl. Ex. 110, UBER00006261.)

11 69. I note that Dr. McManamon addressed this trade secret, but did not dispute that  
12 Uber uses it. (McManamon Decl. ¶ 63.)

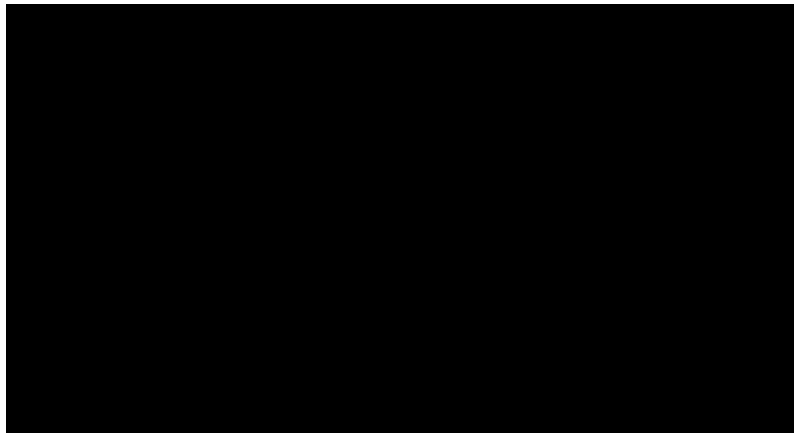
13 70. *Qualification as Trade Secret.* This trade secret is not generally known in the  
14 relevant field of technology. I am not aware of any other LiDAR system that includes a [REDACTED]  
15 [REDACTED]  
16 [REDACTED]  
17 [REDACTED]. Dr. McManamon's  
18 declaration states that this design is "commonplace," but does not cite any evidence to support that  
19 argument. (McManamon Decl. ¶ 63.) I disagree with Dr. McManamon's characterization.

20 71. Waymo's trade secret also derives independent economic value because it allows  
21 Waymo's LiDAR system to [REDACTED]  
22 [REDACTED] without interfering with the device's ability to rotate and therefore take 360-degree  
23 measurements.

24 [REDACTED]  
25 [REDACTED]  
26 [REDACTED]  
27 [REDACTED]  
28 [REDACTED]

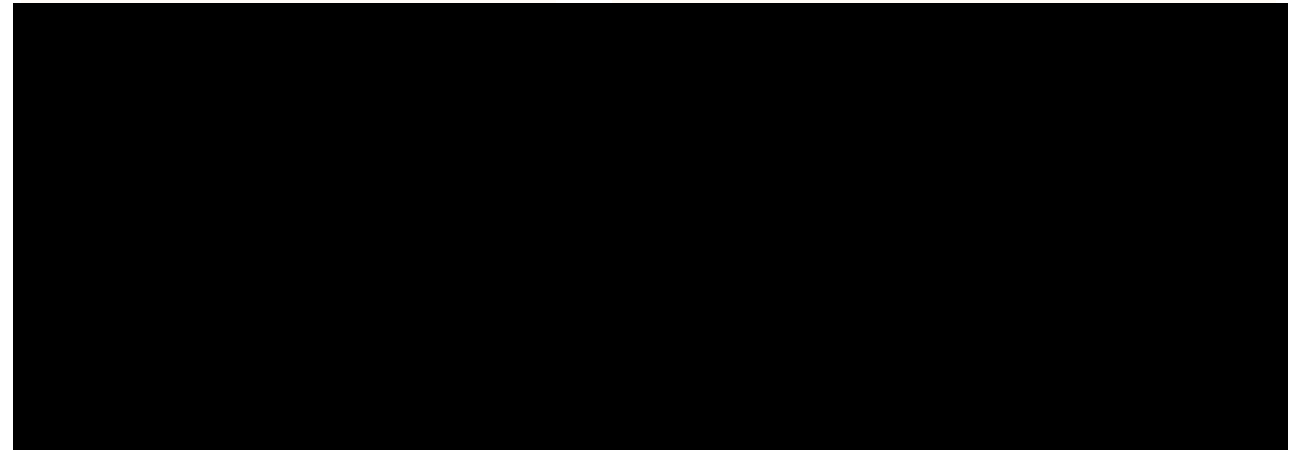
1           72.     *Use by Defendants.* My review of the relevant documentation in this case,  
2 including documents produced by Uber indicates a high likelihood that Uber has or is currently  
3 using Google's trade secret concepts relating to [REDACTED]  
4

5           73.     As part of its next generation hybrid medium- and long- range LiDAR system,  
6 Waymo developed a specific design involving a [REDACTED]  
7 [REDACTED] is depicted in, for example,  
8 the schematic provided below:  
9



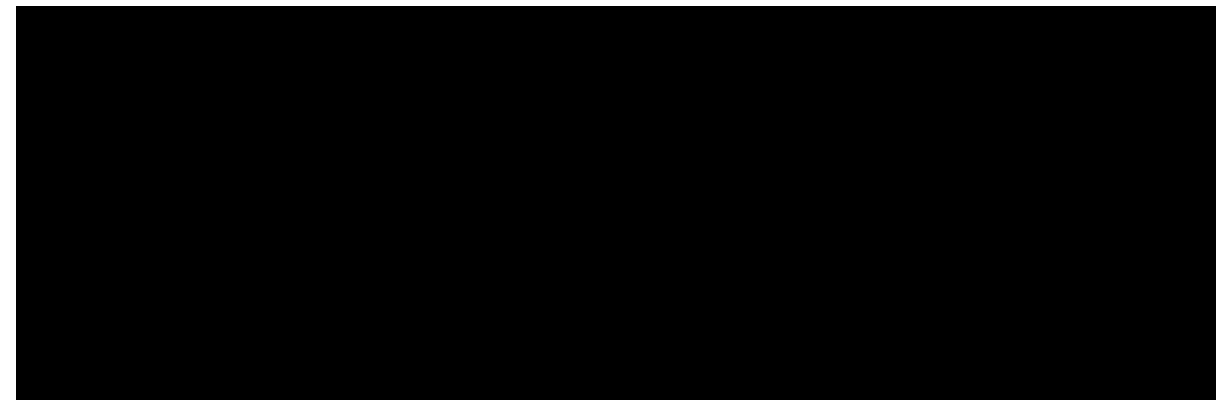
10  
11  
12  
13  
14  
15 (Jaffe Opening Decl. Ex. 18 at 7.)  
16

17           74.     Uber's document production indicates that Odin Wave (a predecessor to Tyto  
18 LiDAR, which was subsequently acquired by Otto) was developing schematics involving a similar  
19 [REDACTED]. For example, the schematic  
20 shown at UBER00005076 [REDACTED]  
21 [REDACTED]  
22 [REDACTED] These documents therefore indicate that Odin  
23 Wave/Tyto LiDAR was developing the same [REDACTED] as was being  
24 developed at Waymo. [REDACTED] was then made available to Otto and Uber as its schematics  
25 were produced from Uber's custodial files.  
26  
27  
28



(Jaffe Reply Decl. Ex. 92, UBER00005076 (left), UBER00005077 (right).)

75. A physical inspection of Uber's [REDACTED] LiDAR device provides further support for my conclusion that Uber acquired, and was seeking to leverage, Waymo's [REDACTED]. [REDACTED] Although I have not yet had the opportunity to personally inspect the [REDACTED] device, photographs from an April 19, 2017 inspection, such as those set forth below, indicate that this device is using [REDACTED].



(Jaffe Reply Decl. Ex. 101, UBER00011676 (left); Jaffe Reply Decl. Ex. 107, UBER00011678 (right).)

76. Additionally, to implement [REDACTED] like that described in Waymo's documents and embodied by Uber's [REDACTED] system, a person of skill in the art would understand that it would be desirable to [REDACTED].

Waymo  
Trade Secret No. 48 relates to Waymo's time and effort to discover the appropriate

77. The documents produced in this case show that Otto/Uber is seeking to leverage Waymo's research into . For example, , in response to an email regarding , Anthony Levandowski responded

Otto engineer Sameer Khirshagar testified at his deposition that Mr. Levandowski was used in Uber's " " LiDAR system. (Jaffe Reply Decl. Ex. 91, Khirshagar Dep. at 34:6-37:4.)

78. *Qualification as Trade Secret.* Waymo's is unique, and not generally known implemented with an is unique, and not generally known in the relevant field. Waymo's implementation requires a using and it is that allow the

79. Waymo's technique enabled by its derives independent economic value by virtue of the fact that it is not generally known in the field. Achieving this greatly simplifies the overall circuitry and makes the design less expensive. Moreover, the use of allows

The ability to design a LiDAR device leveraging this technology is a competitive advantage to the extent that others in the relevant field do not possess the knowledge of Google circuit design and approach.

### **III. THE '922 AND '464 PATENTS**

80. Since my Original Declaration, I have inspected the Fuji system and reviewed the limited technical documentation made available by Defendants related to that system. While I believe my original opinions were reasonable based on the information then available, the newly



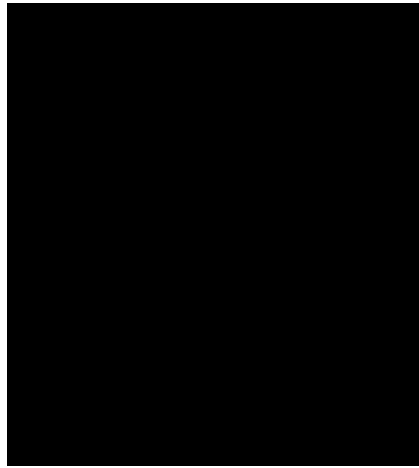
1 provided information requires me to withdraw my opinion that the Fuji system infringes the '922  
2 and '464 patents. I reserve the right to re-allege that this system infringes these patents at a later  
3 date if new evidence becomes available supporting such an opinion.

4 81. Since my original declaration, Defendants have produced documents and testimony  
5 regarding another of their LiDAR designs, called [REDACTED]. I have not yet had an opportunity to  
6 personally inspect the [REDACTED] device, but I have reviewed available documentation, deposition  
7 testimony, and photographs of the [REDACTED] system in forming my opinions herein.

8 82. As discussed in my original declaration, Otto filed a submission with the Nevada  
9 Department of Motor Vehicles on September 19, 2016, indicating that it was developing and/or  
10 deploying an "In-house custom built 64-laser (Class 1) emitting 6.4 million beams a second at 10  
11 Hz." It is my opinion that this device most likely corresponds to the [REDACTED] device that the  
12 Defendants recently made available for inspection. Like the device described in the Nevada  
13 submission, the [REDACTED] device is designed to include [REDACTED] positions [REDACTED]  
14 [REDACTED]. The [REDACTED], and are  
15 considered [REDACTED]. I understand Defendants have represented that the [REDACTED] device was  
16 designed to [REDACTED] rather than 6.4 million as disclosed in the Nevada  
17 submission; however, it would not be surprising if Otto changed this target over time, or increased  
18 the rotational frequency of the device in order to obtain a comparable amount of data. The  
19 development timeline for the [REDACTED] and Fuji devices supports my conclusion that the Nevada  
20 submission was referring to the [REDACTED] device. Otto filed the submission on September 19, 2016,  
21 and according to Mr. Haslim and Mr. Boehmke, Uber did not begin working on the Fuji device  
22 until late October 2016. Accordingly, [REDACTED] is the only device that I am aware of Otto  
23 developing at the time of the Nevada submission.

24 83. My opinion is that the available evidence suggests that there is a high likelihood  
25 [REDACTED] system [REDACTED]  
26 [REDACTED]  
27 [REDACTED]  
28

1 [REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Dep. at 45:22-48:15; Jaffe  
2 Reply Decl. Ex. 67, Boehmke Dep. at 44:8-45:14.)



10 (Jaffe Reply Decl. Ex. 88, UBER00011654.)

11 84. Thus, it is my opinion that the [REDACTED] system infringes at least one claim of each the  
12 '922 and '464 patents, as shown in the exemplary claim charts set forth below.

'922 Patent	
Claim 1 Element	Evidence
a lens mounted to a housing, wherein the housing is configured to rotate about an axis and has an interior space that includes a transmit block, a receive block, a transmit path, and a receive path, wherein the transmit block has an exit aperture in a wall that comprises a reflective surface, wherein the receive block has an entrance aperture, wherein the transmit path extends from the exit aperture to the lens, and wherein the receive path extends from the lens to the entrance aperture via the reflective surface;	<p>[REDACTED] (Boehmke Decl. Ex. H at 14 ("Rotate assembly at 20Hz") (Mr. Boehmke testified that [REDACTED].") (Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 58:21-22.)); (Jaffe Reply Decl. Ex. 87, UBER00011631.)</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 36:16-25.)</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim Depo. Tr. at 47:9-19; Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 44:8-45:14; Jaffe Reply Decl. Ex. 82, Gruver Depo.</p>

1		Tr. at 67:15-22; Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr. at 37:1-13.)
2		
3	a plurality of light sources in the transmit	[REDACTED]
4	block, wherein the plurality of light sources	[REDACTED] (Jaffe Reply Decl. Ex.
5	are configured to emit a plurality of light	68, Haslim Depo. Tr. at 46:18-20.) [REDACTED]
6	beams through the exit aperture in a plurality	[REDACTED]
7	of different directions, the light beams	[REDACTED]
8	comprising light having wavelengths in a	[REDACTED] (Jaffe Reply Decl. Ex. 82, Gruver
9	wavelength range;	Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H
10		at 13-14.)
11	a plurality of detectors in the receive block,	[REDACTED]
12	wherein the plurality of detectors are	[REDACTED]
13	configured to detect light having wavelengths	[REDACTED] (Jaffe
14	in the wavelength range; and	Reply Decl. Ex. 68, Haslim Depo. Tr. at
15		45:25-46:1; Jaffe Reply Decl. Ex. 82, Gruver
16		Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H
17		at 13.)
18	wherein the lens is configured to receive the	[REDACTED]
19	light beams via the transmit path, collimate	[REDACTED]
20	the light beams for transmission into an	[REDACTED]
21	environment of the LIDAR device, collect	[REDACTED]
22	light comprising light from one or more of	[REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim
23	the collimated light beams reflected by one or	Depo. Tr. at 47:9-19; Jaffe Reply Decl. Ex.
24	more objects in the environment of the	67, Boehmke Depo. Tr. at 44:8-45:14; Jaffe
25	LIDAR device, and focus the collected light	Reply Decl. Ex. 82, Gruver Depo. Tr. at
26	onto the detectors via the receive path.	67:23-68:4.) [REDACTED]
27		[REDACTED]: (Jaffe
28		Reply Decl. Ex. 88, UBER00011654.)

'464 Patent	
Claim 1 Element	Evidence
a lens mounted to a housing, wherein the housing is configured to rotate about an axis and has an interior space that includes a transmit block, a receive block, a transmit path, and a receive path, wherein the transmit block has an exit aperture, wherein the receive block has an entrance aperture, wherein the transmit path extends from the exit aperture to the lens, wherein the receive path extends from the lens to the entrance	[REDACTED] [REDACTED] (Boehmke Decl. Ex. H at 14 ("Rotate assembly at 20Hz") (Mr. Boehmke testified that [REDACTED] [REDACTED] (Jaffe Reply Decl. Ex. 67, Boehmke Depo. Tr. at 58:21-22.)); (Jaffe Reply Decl. Ex. 87, UBER00011631.) [REDACTED]

1 aperture, and wherein the transmit path at  
 2 least partially overlaps the receive path in the  
 3 interior space between the transmit block and  
 4 the receive block;

(Jaffe Reply Decl.  
 Ex. 64, Pennecot Depo. Tr. at 36:16-25.)

(Jaffe Reply Decl. Ex. 64, Pennecot Depo. Tr.  
 at 37:1-16.)

(Jaffe Reply Decl. Ex. 68,  
 Haslim 47:9-19; Jaffe Reply Decl. Ex. 67,  
 Boehmke 44:8-45:14; Jaffe Reply Decl. Ex.  
 64, Pennecot Depo. Tr. at 37:1-16.)

(Jaffe Reply Decl. Ex. 68, Haslim  
 47:20-48:8; Jaffe Reply Decl. Ex. 67,  
 Boehmke 45:8-14; Jaffe Reply Decl. Ex. 82,  
 Gruver 67:15-18; Jaffe Reply Decl. Ex. 64,  
 Pennecot Depo. Tr. at 37:14-38:8.)

17 a plurality of light sources in the transmit  
 18 block, wherein the plurality of light sources  
 19 are configured to emit a plurality of light  
 20 beams through the exit aperture in a plurality  
 21 of different directions, the light beams  
 comprising light having wavelengths in a  
 wavelength range;

(Jaffe Reply Decl. Ex.  
 68, Haslim Depo. Tr. at 46:18-20.)  
 (Jaffe Reply Decl. Ex. 82, Gruver  
 Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H  
 at 13-14.)

22 a plurality of detectors in the receive block,  
 23 wherein the plurality of detectors are  
 24 configured to detect light having wavelengths  
 25 in the wavelength range; and

(Jaffe  
 Reply Decl. Ex. 68, Haslim Depo. Tr. at  
 45:25-46:1; Jaffe Reply Decl. Ex. 82, Gruver  
 Depo. Tr. at 68:5-15); (Boehmke Decl. Ex. H  
 at 13.)

1 wherein the lens is configured to receive the  
 2 light beams via the transmit path, collimate  
 3 the light beams for transmission into an  
 4 environment of the LIDAR device, collect  
 5 light comprising light from one or more of  
 6 the collimated light beams reflected by one or  
 7 more objects in the environment of the  
 8 LIDAR device, and focus the collected light  
 9 onto the detectors via the receive path.

[REDACTED]  
 [REDACTED]  
 [REDACTED]  
 [REDACTED] (Jaffe Reply Decl. Ex. 68, Haslim  
 Depo. Tr. at 47:9-19; Jaffe Reply Decl. Ex.  
 67, Boehmke Depo. Tr. at 44:8-45:14; Jaffe  
 Reply Decl. Ex. 82, Gruver Depo. Tr. at  
 67:23-68:4.) [REDACTED]  
 [REDACTED]: (Jaffe  
 Reply Decl. Ex. 88, UBER00011654.)

9 85. I reserve the right to provide more detailed opinions about infringement of the '922  
 10 and '464 patents by the [REDACTED] system after further discovery on that system.

12 I declare under penalty of perjury that the foregoing is true and correct.

14 DATED: April 21, 2017

/s/ Gregory Kintz  
 Gregory Kintz

**SIGNATURE ATTESTATION**

Pursuant to Local Rule 5-1(i)(3), I attest under penalty of perjury that concurrence in the filing of this document has been obtained from Gregory Kintz.

/s/ Charles K. Verhoeven  
Charles K. Verhoeven